U-WAVE-T

User's Manual
No.99MAL108B5

Introduction

The U-WAVE-T is a wireless communication tool for transmitting measurement data to the Mitutoyo U-WAVE-R (option) by connecting to a Digimatic-output interfaced tool with the supplied connecting cable. The U-WAVE-T is also categorized into two types: IP67 type and buzzer type. To obtain the highest performance and the longest service life from the U-WAVE-T, carefully read this User's Manual thoroughly prior to use. After reading this manual, keep it near the U-WAVE-T for quick reference. The specifications of the U-WAVE-T and descriptions in this manual are subject to change without prior notification.

Safety Precautions

Use the U-WAVE-T in conformance with the specifications, functions and precautions for use given in this manual. If the U-WAVE-T is used in other way, it may jeopardize safety.

WARNING

- Do not use the U-WAVE-T near a medical device that has a possibility of causing a malfunction due to radio waves.
- The U-WAVE-T using an electric wave has a possibility that communication is interrupted under the influence of external noises, etc., even within the distance of communication of the electric wave. In this case take sufficient failure prevention action (security measures).
- In the event the U-WAVE-T should fail, take sufficient failure prevention action (security measures).
- Do not disassemble, short, modify, or heat the supplied battery. The leaked contents may get into your eyes. Also, heat generation or explosion may result.
- The battery used in the U-WAVE-T contains an irritating substance.
  Should this liquid substance be applied to your eyes or skin by accident, immediately rinse it away in clean water.
- Should the battery be swallowed by accident, immediately rinse the mouth out and induce vomiting the battery while drinking a large amount of water. After then consult a doctor.

Notes on Export Regulations

WARNING

The U-WAVE-T falls into the Catch-All-Controlled Goods or Program under the Category 16 of the Separate Table 1 of the Export Trade Control Order or the Category 16 of the Separate Table of the Foreign Exchange Control Order, based on the Foreign Exchange and Foreign Trade Law of Japan.
Further, this User's Manual also falls into the Catch-All-Controlled Technology for use of the Catch-All-Controlled Goods or Program, under the Category 16 of the Separate Table of the Foreign Exchange Control Order.
If you intend re-exporting or re-providing the product or technology to any party other than yourself, please consult with Mitutoyo prior to such re-exporting or re-providing.

Precautions for the Wireless Law

The U-WAVE-T can use in Japan, EU member countries, U.S.A, Canada .
The U-WAVE-T cannot be used in countries other than Japan, EU member countries, U.S.A, Canada

WARNING

- The U-WAVE-T must follow the corresponding regulation which is specified in the country to use an electric wave.
- Do not disassemble or modify any part of the U-WAVE-T.
- Do not peel off the certification label stuck on the U-WAVE-T.
  The use of any U-WAVE-T without the label is prohibited.
- Remove the battery before taking an airplane and do not use the U-WAVE-T in the airplane. The use of a wireless equipment in the airplane is prohibited.

This device complies with Part 15 of the FCC Rules and RSS-Gen of IC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.
This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la class B est conforme à la norme NMB-003 du Canada.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notes

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications, However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.

Precautions on Wireless Communication Environments

Notice that performance of the U-WAVE-T may not be fully delivered depending on the environment such as a midway obstruction.
For the items of obstruction factors refer to the following table.

1) The U-WAVE-T may not be able to communicate in the case.

Item	Description
Concrete wall	Disables communication if the U-WAVE-T is completely enclosed with a concrete wall.
Metallic partition, etc.	Have the possibility of reducing the communication speed or blocking communication.
Wireless LAN, Bluetooth ZigBee, microwave oven, and other communication devices	Have the possibility of reducing the communication speed or blocking communication. Separate the communication channel (band ID) and installation site of each device as far as possible from those of the U-WAVE-T.
Machine tools, etc.	In the worksite operated with machine tools such as electrical discharge Machines, crane for transfer, arc welding etc., have the possibility of reducing the communication speed or blocking communication.

2) **The U-WAVE-T may influence on the peripheral equipment in the case**

Item	Description
Medical device	Do not use the U-WAVE-T near a medical device such as a laser surgical knife and a bathroom scale.

Precautions for Dust and Water Resistance

To obtain the highest performance from the IP67 type U-WAVE-T, be sure to observe the following precautions.

IMPORTANT

- The dust and water resistance of the U-WAVE-T is assured under the condition where the connecting cable is connected and the battery cover is mounted.
  If the U-WAVE-T is not used for an extended period, store it with each cover mounted to prevent from water and oil.
- To deliver the maximum performance of protection against water and dust (IP67), mount the battery cover tightly with screws after setting the battery. Also, do not remove the packing from the cover.
- If the connecting cable sheath is broken, a liquid will infiltrate into the U-WAVE-T and a Measuring tool due to capillary phenomenon, resulting in trouble. Immediately replace the cable.
- Use the U-WAVE-T with sufficient care so that the packing on each part may not be damaged with cutting chips, dirt, etc. Should any packing be damaged, the dust and water resistance will be impaired. Immediately replace the packing or have the U-WAVE-T repaired by a service center.
- Rubber and other materials used for rubber caps and sealing portions are not fully effective for diversified coolants, chemicals, etc. If these materials become deteriorated markedly, consult the nearest Mitutoyo sales office.
- The U-WAVE-T is provided with such a structure that cannot be disassembled by applying seals to individual parts.
  If any sealed part is disassembled, then a predetermined performance will not be delivered.
- Do not use the U-WAVE-T at sites which might be submerged. The U-WAVE-T cannot prevent liquids such as a coolant from infiltrating.

TIP

IP67 protection level (For details refer to IEC 60529.)

- Protection against foreign matters (Level 6): Protects an object against the ingress of dust and dirt, and against a full contact with it.
- Protection against water (Level 7): No causing harmful effects when submerged in water for 30 minutes with its bottom end at a depth of 1 m below the surface of water.

Other Precautions

The following deeds and situations will cause a failure or malfunction in the U-WAVE-T.
Care should be exercised.

IMPORTANT

- Do not give a sudden shock such as a drop or apply an excessive force to the U-WAVE-T.
- If the U-WAVE-T is not used more than 3 months, remove the battery from the U-WAVE-T and store it in a safe place. Otherwise, leaks from the battery may damage the U-WAVE-T.
- Avoid using or storing the U-WAVE-T at sites which are exposed to direct sunlight, excessively high or low temperature.
- Avoid using or storing the U-WAVE-T at sites where it may be subject to the adhesion of solution such as acid and alkali or organic solvent.
- If a high-voltage device such as an electro-spark engraving pen is used for the U-WAVE-T, the internal electronic parts may be damaged.
- Exercise care so as not to apply an undue force or curvature to the connecting cable.
- If the battery voltage has come down, replace the battery ahead of time before the operation becomes unstable.

Warranty

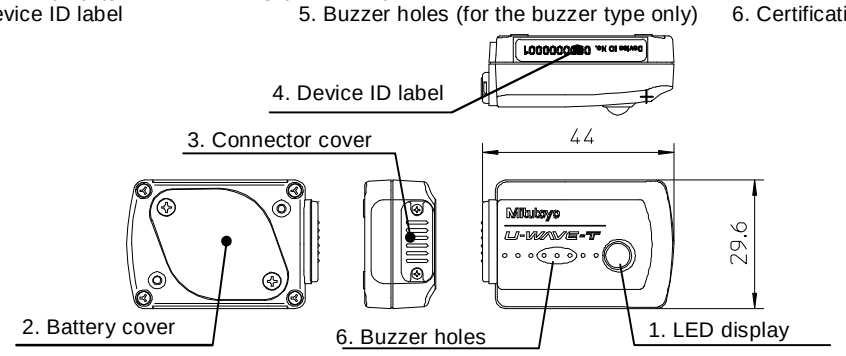
In the event that the U-WAVE-T should prove defective in workmanship or material, within one year from the date of original purchase for use, it will be repaired or replaced, at our option, free of charge upon its prepaid return to us.
This warranty is effective only where the U-WAVE-T is properly installed and operated in conformance with the instructions in this manual.

Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems)

This symbol on the U-WAVE-T or on its packaging indicates that the U-WAVE-T shall not be treated as household waste. To reduce the environmental impact of WEEE (Waste Electrical and Electronic Equipment) and minimize the volume of WEEE entering landfills, please reuse and recycle.
For further information, please contact your local dealer or distributors.

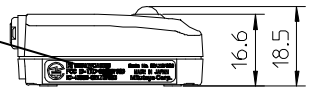
[1] Name of Each Part and External Dimensions (Unit : mm)

1. LED display (green, red, orange)
2. Battery cover
3. Connector cover
4. Device ID label
5. Buzzer holes (for the buzzer type only)
6. Certification label



(for the Buzzer type)

5. Certification label
(This label is different according to the type.)



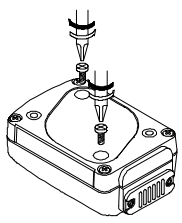
[2] Replacing the Battery

1) Setting the battery

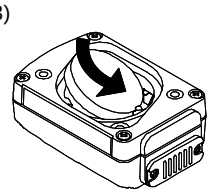
No battery has been set before shipping. After unpacking the U-WAVE-T, set the battery with the following procedure. When screwing or unscrewing the screws, always use the size 0 screwdriver (No. 05CZA619) of the standard accessory and tighten or loosen them with a torque of 5 to 8 N•cm.

(1) Remove the two mounting screws (M2.5X0.45X3/No. A115-2515C) with the size 0 screwdriver.
(2) Dismount the battery cover.
(3) Orientate the battery plus side toward the cover, slide its one end into the "+" terminal on the U-WAVE-T, and then insert the other end into the battery retaining claw.
(4) Check that the packing (No. 02AZD734) has been attached correctly to the specified position.
(5) Mount the battery cover.
(6) Tighten the mounting screws with the size 0 screwdriver to fix the cover.
(7) Make sure that no part of the packing is detached.

(1),(6)



(3)



2) Removing the battery

To remove the battery, use a small flat-blade screwdriver, etc. Insert the screwdriver between the battery retaining claw and the battery, and then remove the battery by using the screwdriver as leverage.

3) Low battery alarm

If the battery voltage becomes considerably low, the LED display blinks red and the U-WAVE-T sends a low battery alarm error to the U-WAVE-R. Immediately replace the battery.
(The buzzer type alarms a low battery voltage with a buzzer sound along with a blinking LED.)
In addition, the battery (CR2032) used as the power supply for the U-WAVE-T has such a property that the battery voltage is abruptly restored in a period when the battery has been exhausted, if measurement data is consecutively transmitted at intervals of several seconds. In such cases, although low battery alarm errors are not output, the LED display becomes dark and the buzzer sound becomes small gradually. In such cases, replace the battery immediately.

IMPORTANT

- Always use the CR2032 battery (lithium battery).
- The battery supplied at the time of purchase is to check the functions and performance of the U-WAVE-T. The predetermined length of life may not be met.
- Even for the used CR2032 battery, its voltage may recover in a short time after it is removed from the U-WAVE-T. However, do not continue to use the old battery. Be sure to replace the battery with a new one.
- Upon disposal of the battery comply with the related ordinance, regulation, etc.
- When removing or setting the battery, exercises care so as not to break or bend the battery terminal by applying an undue force to it. Especially, if a broken piece of the battery terminal should enter the U-WAVE-T, a failure may be caused.

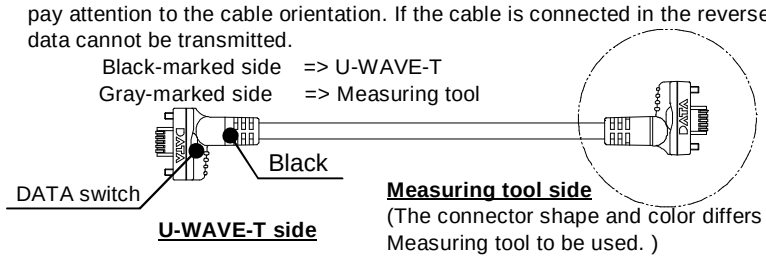
[3] Connect the Connecting cable to U-WAVE-T

- After loaded with the battery, connect the connecting cable (option, details see section 8)

IMPORTANT

When installing the U-WAVE-T using the connecting cable (02AZD790A, B), particularly pay attention to the cable orientation. If the cable is connected in the reverse orientation, data cannot be transmitted.

Black-marked side => U-WAVE-T
Gray-marked side => Measuring tool

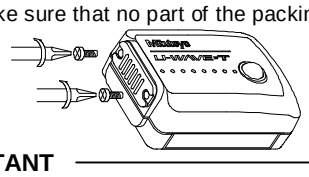


U-WAVE-T side

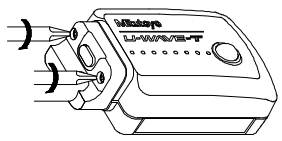
Measuring tool side
(The connector shape and color differs depending on the Measuring tool to be used.)

- Set up the connecting cable with the following procedure.
  When screwing or unscrewing the screws, always use the size 0 screwdriver of the standard accessory and tighten or loosen them with a torque of 5 to 8 N•cm.
(1) Remove the two mounting screws (M1.7X0.35X2.5/No.A115-1712C) of the connector cover with the size 0 screwdriver.
(2) Dismount the connector cover.
(3) Check that the packing (No. 09GAA374) has been attached correctly to the specified position.
(4) Connect the connecting cable with the U-WAVE-T.
(5) While pressing the connecting cable end with fingers, tighten the cable fixing screws so that no gap appears between the cable connector and the U-WAVE-T.
(6) Make sure that no part of the packing is detached.

(1)



(5)



IMPORTANT

Do not connect the connecting cable forcibly in a state that the packing (No. 09GAA374) is not in the correct position on the U-WAVE-T body. Otherwise, the packing may be damaged so that a failure may be caused.

[4] Register the setting information of U-WAVE-R

After loaded with the battery and connected to a connecting cable, the U-WAVE-T needs to register the setting information of U-WAVE-R.
Please read the "U-WAVEPAK User's Manual" in "PDF_Manual" folder of the CD supplied as a standard accessory of U-WAVE-R for a detailed registering method and content.
"Adobe Reader" of Adobe Systems INC. is necessary to read.

IMPORTANT

- "Registering the setting information" should be performed by DATA switch of the connecting cable before connecting to the Measuring tool.
- The registered information is stored after changing battery.

[5] Connecting to Measuring tool

- After registering the setting information, connect the U-WAVE-T to the Measuring tool.
- Clamp the cable leading to a Measuring tool using the supplied cable clamp or a Velcro fastener so that measurement is not interfered and the LED display of the U-WAVE-T can be easily viewed.

IMPORTANT

- Exercise great caution about the cable routing,
  Cable may be disconnected from the instrument or connection part may be damaged if the excessive force is applied when the cable is snagged to the workpiece, etc..
- Tighten the connecting cable (02AZD790A, B, G) to the Measuring tool with the screw surely.

[6] Functions

1) Data communication

The U-WAVE-T performs data communication with DATA switch as shown below.

Operations	DATA switch push-down time t	LED
Transmits measurement data.	t ≤ 2sec	None
Transmits the Cancel command.	2 sec < t ≤ 5 sec	Orange blinking 0.1 sec interval
Executes U-WAVE-R search.	5 sec < t ≤ 10 sec	Orange blinking 0.3 sec interval

NOTE

- The Cancel command is a command to inform a U-WAVE-R of data error when wrong measurement data is transmitted to the U-WAVE-R due to an operating error. However, the wrong measurement data is not canceled by the command. It is to inform that the previous data is different from measuring value.
- When the U-WAVE-R search is executed, U-WAVE-T is connected with U-WAVE-R that can be registered.
- If the DATA switch is held down for more than 10 seconds, the orange LED stops blinking and nothing will function.

The U-WAVE-T can check whether to have performed normal communication with a U-WAVE-R by a specific LED display (and buzzer sound).
However, buzzer sounds are available only for the buzzer type U-WAVE-T.

Description of state	LED	Buzzer sound
Wireless communication has been properly completed.	Green LED blinking	Short 2 times
• Wireless communication has failed. • An error has occurred.	Red LED blinking	Long 1 time

2) Initializing the setting information

If communication is disabled while using the U-WAVE-T, first refer to Troubleshooting
In U-WAVE-R User's Manual, if communication is still disabled, initialize the setting information registered in section 4 to default settings, and then retry communication.
Initialize the setting information with the following procedure.
(1) Remove the battery being loaded. For information about how to remove the battery, refer to section 2.
(2) While holding down the DATA switch on the connecting cable connector, reload the battery in place. The setting information is initialized.
(3) Remount the battery cover, and set up the U-WAVE-T.

IMPORTANT

Once initialization is performed, the setting information used until then is all cleared.

[7] Specifications

Model	IP67 type	Buzzer type
Code No.	02AZD730D	02AZD880D
Certification number	005WWCA0166(Japan) VXU-02AZD730D (U.S.A) 4396B-02AZD730D (Canada)	005WWCA0168(Japan) VXU-02AZD880D (U.S.A) 4396B-02AZD880D (Canada)
Protection class	IP67	-
With/without buzzer	Without	With
Transmission output	Less than 1 mW (0 dBm)	
Distance of communication	Approx. 20 m (line-of-sight distance under office environments)	
A Conformity standard	**Japan** ARIB STD-T66 **Europe** EN 50371：2002 EN 300 440-1 V1.3.1 and EN 300 440-2 V1.1.2 EN 301 489-01 V1.6.1 and EN 301 489-03 V1.4.1 **U.S.A** ・47 CFR Part 15.247:(Subpart :C) ・47 CFR Part 15,(Subpart :B) **Canada**・RSS-210 (Issue 7) and RSS-Gen (Issue 2) ・ICES 003 (Issue 4) CE	
Wireless communication protocol	IEEE802.15.4 compatible	
Communication frequency	2.405 to 2.475 GHz	
Used band	15 channels (at intervals of 5 MHz)	
Modulation method	DSSS (Direct Sequence Spread Spectrum)	
Wireless communication speed	250 Kbps	
LED display	Green/orange/red: 3 discrete color display	
Battery	CR2032 (3V): 1 piece	
Battery life	400,000 times	
Operating temperature (humidity)	0 to 40°C (20 to 80%RH, with no condensation)	
Storage temperature (humidity)	-10 to 60°C (20 to 80%RH, with no condensation)	
External dimensions	44 X 29.6 X 18.5 (mm)	
U-WAVE-T mass	Approx. 23 g	

○ Standard accessories

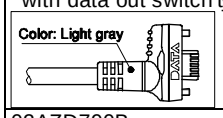
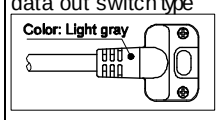
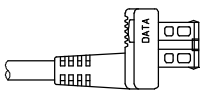
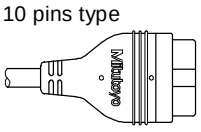
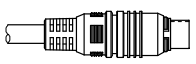
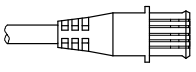
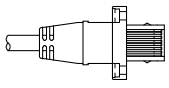
・User's manual (this manual) No. 99MAL108B ・Precaution for the battery No.99MAL111W
・Size 0 screwdriver No. 05CZA619 ・Lithium battery ・ CR2032C(B)N ・Warranty card

○ Optional accessories

No. 02AZD790A to G: Connecting cables (For details see section 8.)

[8] Connecting Cables

As for connecting cables, it is necessary to select a cable compatible with a Measuring tool to be used.
Use an appropriate connecting cable from among those in the following table.

Parts No. Model	Series No,	Product Name	
02AZD790A Water-resistant type with data out switch type 	500 500 571 572 573	ABS Coolant Proof Caliper Super Caliper ABS Coolant Proof Depth Gage ABS Coolant Proof Digimatic Scale Units ABS Coolant Proof Exclusive Caliper	CD-PMX/PM/GM CD-SPM VDS-PMX SD-G NTD-PMX/PM
02AZD790B Water-resistant type with data out switch type 	293 293 --- 329 350 --- 468	Coolant Proof Micrometer Coolant Proof Micrometer Coolant Proof Exclusive Micrometer Depth Micrometer Coolant Proof Digimatic Micrometer Heads Digimatic Exclusive Micrometer Digimatic Holtest	MDC-MJ/MJT MDE-MJ (The end of the mark is –MJ) DMC-M MHN-M/MJ/MJN (The end of the mark is –M/PM) HTD-R
02AZD790C With data out switch type 	500 571 572 500 ---	ABS Digimatic Caliper ABS Digimatic Depth Gage ABS Digimatic Scale Units ABS Digimatic Caliper ABS Digimatic Exclusive Caliper	CD-CX/C VDS-/DCX/DC SD-D/SDV-D CD-SC (The end of the mark is –CX/C)
02AZD790D 10 pins type 	178 179 515 518 519 542 543 544 544 572 574	Surftest Digi-Derm CERA Height Master QM-Height Digital Mu-Checker Display Unit Digimatic Indicator Laser Scan Micrometer Laser Scan Micrometer (It applies when using Digimatic Codeout unit. (02AGC840)) Difference/Sum Unit Heightmatic	SJ-201/301/401/402 DGE HMD-C QMH-S M EB/EC-D ID-H/ID-F LSM-9506 LSM-6200/6900 SD-U1 HDF
02AZD790E 6 pins type 	164 227 227 293 --- 293 --- 339 337 468 515 568 810 810	Digimatic Micrometer Heads Digimatic Micrometer Heads Soft-Touch Micrometer Quickmike Exclusive Quickmike Digimatic Micrometer Digimatic Exclusive Micrometer Digimatic Tubular Inside Micrometer Digimatic Tubular Inside Micrometer Digimatic Holtest Digital Height Master ABS Boremetic Hardness Testing Machine Rockwell Type Hardness Testing Machines	MHD-M CLM-MH CLM MDQ (The end of the mark is –QM) MDC-M (The end of the mark is -DM) IMJ-M IMZ-M HTD HME-DM SBM-C HM-100/200/HV-100/HH-411 HR-500
02AZD790F A flat form straight type 	192 500 511 543 543 550 551 552 570 547 572 574 575 811	Digimatic Height Gage Digimatic Caliper ABS Digimatic Bore Gage ABS Digimatic Indicator ABS Digimatic Indicator Digimatic Caliper Digimatic Caliper Digimatic Carbon Fiber Caliper ABS Digimatic Height Gage ABS Digimatic Depth Gage ABS Digimatic Scale Units Heightmatic ABS Digimatic Indicator Hardness Testing Units	HDM-A/HD-A CD CG-D ID-S ID-C CD CD CFC HDS-HC/C SD-E/SDV-E/SD-V/SDV-F HDF-N ID-U HH-300
02AZD790G Water-resistant type with flat form straight type 	543	ABS Digimatic Indicator	ID-N/ID-B

Mitutoyo Corporation
20-1, Sakado 1-Chome, Takatsu-ku, Kawasaki-shi, Kanagawa 213-8533, Japan

Mitutoyo KAWASAKI, JAPAN